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ABSTRACT

One of a series of studies on the development of technical and vocational education in the member states of UNESCO, this report profiles the educational system in India. The seven parts of the document provide information about the following: geography and education, structure of the educational system, national educational policy, management and financing of the technical education system, the vocational education and training system, and challenges and future perspectives. Some of the highlights are as follows: (1) India has a long tradition of education, both formal and informal; (2) the modern education system was started around 1854 with the implementation of Macaulay's recommendations and was based on British colonial interests--but still was opened up to the masses; (2) the literacy rate is about 52 percent, with about 64 percent of males and 39 percent of females being literate; (3) the literacy rate varies considerably from state to state; (4) the educational system has 5 years of primary education, 5 years of secondary education, and 2 years of general or vocational education (grades 11-12); (5) university education and professional education is mostly privately offered; (6) there has been great growth in polytechnic education, requiring either 10 or 12 years of previous schooling; (7) most of the polytechnics offer 3-year diploma courses in engineering, although some offer electronics, computer science, medical laboratory technology, and other skill; and (8) planned changed in the Indian economy will require the technical education system to become more flexible and efficient. (KC)

ED 399 381

NATIONAL PROFILES IN TECHNICAL AND VOCATIONAL EDUCATION IN ASIA AND THE PACIFIC

India

UNEVOC
International Project on Technical and Vocational Education

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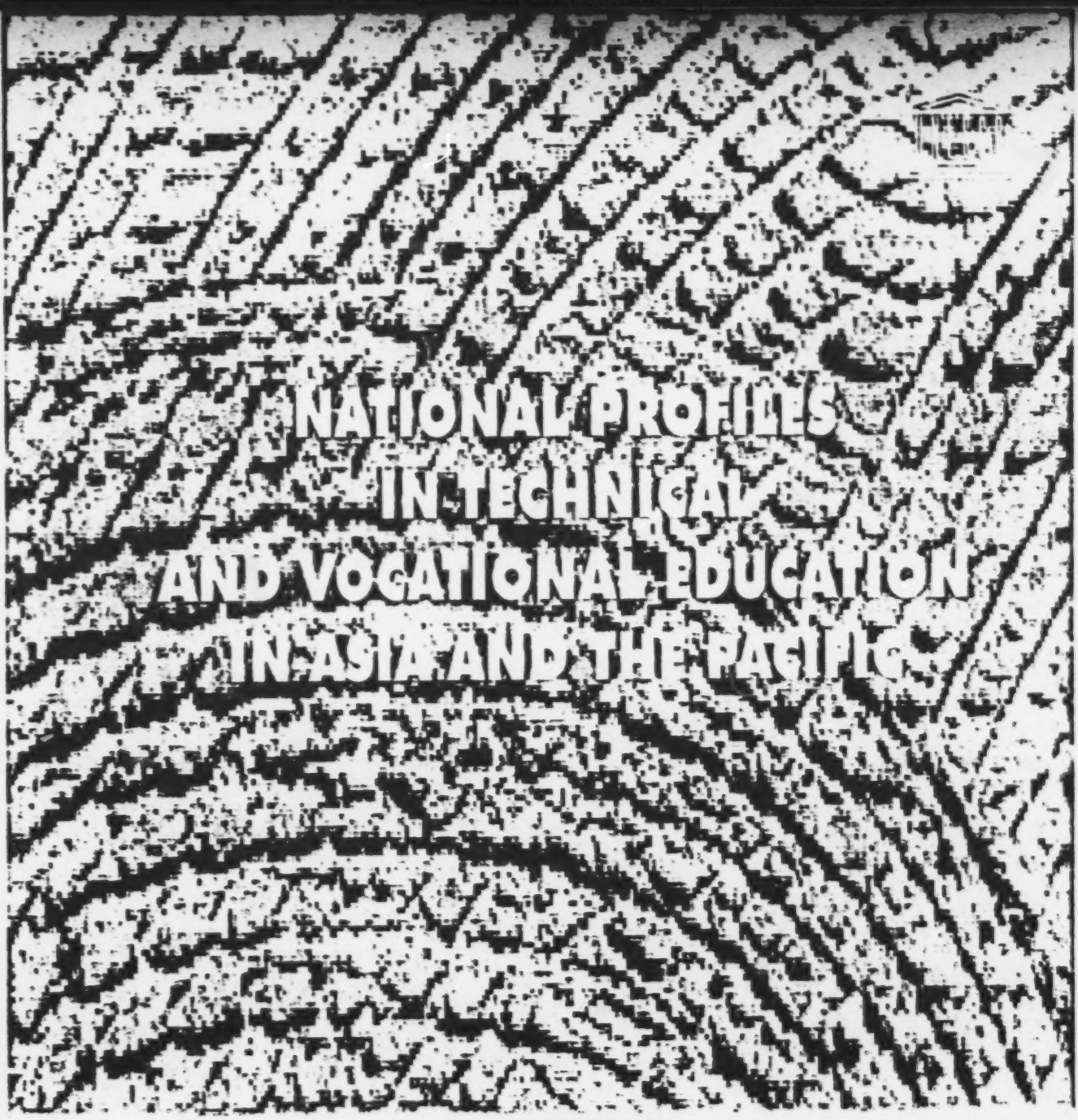

India

UNEVOC

UNESCO PRINCIPAL REGIONAL OFFICE FOR ASIA AND THE PACIFIC, BANGKOK, 1995

This volume is one of a series of member country profiles on Technical and Vocational Education of the following member countries:

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FOREWORD

Technical and vocational education has always been an important component of UNESCO's consecutive Medium Term Plans. The basic objective of this programme is to support the efforts of Member States to link education systems more closely to the world of work and to promote the expansion and improvement of technical and vocational education in the light of changing employment needs.

The Colombo Plan Staff College for Technician Education (CPSC) also dedicates itself primarily to enhancing the growth and development of the technician education systems in its member countries which are located in the Asia and Pacific region. Its programmes, projects and activities are geared to provide the needed impetus for the professional development of senior level personnel involved in technician education development efforts.

UNESCO has launched an International Project on Technical and Vocational Education (UNEVOC) as of 1992 in co-operation with the Government of Germany, ILO, FAO, UNDP and NGOs interested in the reform of technical and vocational education. This project focuses on exchanging information, research and experiences on policy and programme issues in technical and vocational through a network of co-operating institutions.

In a spirit of co-operation between UNESCO and CPSC, under UNEVOC, an attempt is being made to compile and publish studies on the development of technical and vocational education in Member States in the form of TVE profiles of 21 countries. It is hoped that this series will serve as a handy reference information on TVE systems, staff development, technical co-operation and information networking. These studies have been possible because of the full co-operation to UNESCO PROAP and CPSC by all concerned in the Member States.

The opinion expressed in this study are those of the authors and do not necessarily reflect the position of UNESCO and CPSC in this regard. This profile on India was prepared by Prof. M. Radhakrishna, Seconded Faculty Member to CPSC by the Government of India.

C.K. Basu
Director, CPSC

Victor Ordonez
Director, UNESCO PROAP

Part I

GENERAL INFORMATION

1.1 Geographical Information

India is a country with varied geographic and cultural features. The climate varies considerably from arctic in Himalayas to desert climate in Thar desert and to rain forests in southern and eastern parts. The rain pattern also varies with a few mm of rain in Thar desert to a few hundred cm in eastern part of the country (Assam).

The country is situated between the latitudes 8° 4' N to 37°6' N and the longitudes 68° 7' E to 97° 25' E with a land area of 3, 287, 263 sq km (31 March 1982). India has a population of 844. 32 million (1 March 1991). It has a sex ratio of 929 females per 1000 males (males 437.80, females 406.52 million 1991). It is a multicultural society with Hindus 82.6 per cent, Muslims 11.4 per cent, Christians 2.4 per cent, Silks 2.0 per cent, Buddhists 0.7 per cent, Jains 0.5 per cent and others 0.4 per cent (1981). It has 14 well developed Principal languages and many more languages and dialects.

It is predominantly a rural country with 76.7 per cent of the population living in rural areas, some of which are in far-flung, inaccessible areas and the rest 23.3 per cent of the population living in urban areas (1981).

The country is administratively divided into 25 states and 7 union territories.

1.2 Education

India has a long tradition of education, both formally organized universities like Nalanda and Takshashila and small and less formal schools like hermitages or 'Gurukul' where great teachers took care of their students. The education in these schools covered wide ranging aspects like religion, martial arts, state-craft, logic, philosophy, vocational education etc. Conscious effort in educating the large groups of people through Prakrit, a spoken language of people instead of Sanskrit was made during the times of Buddha. This education was free from prejudices regarding, caste, creed, gender, etc.

By eighteenth century, India had a well developed indigenous system of education where-in the institutions voluntarily organized themselves to meet the needs of the society organized on the basis of castes. The schools included religious and general schools.

The modern education system was started around 1854 with the implementation of Macaulay's recommendations. The objectives of the education system were governed by the British colonial interests, and yet it opened up the education to common masses. Though the access to the educational institutions maintained by government was open to all citizens, the education system catered to the needs of the elite with the hope that the education will eventually filter downwards. Hence, no attempt was made by the government to develop universalization of primary education. The demand for the government taking the responsibility of universal primary education has resulted in the passing of compulsory education laws by the state legislatures between 1918 to 1931. However, vast majority of people did not get the benefit as laws were permissive and the education was not relevant. On the basis of compulsory 'basic education' scheme suggested by Mahatma Gandhi in 1937, the government accepted the responsibility of providing free and compulsory education to all children in the age group 6-14 in 1944. This was incorporated as a directive principle in the article 45 of Indian constitution in 1950.

The literacy rate is still low in the country and varies considerably between the different regions and genders. The national literacy average is 52.11 per cent with 63.86 per cent for males and 39.42 per cent for females (1991 statistics, covering age group 7 and above). Some States have literacy as high as 90.59 per cent and some have as low as 38.5 per cent.

The infrastructure for providing the education is as under:

No of Basic/primary schools	550,700
No. of Middle Schools	143,747
No. of Sec/Hr Secondary schools	761,194
No. of Teacher Training Colleges	1,800
No. of Science and Arts Colleges (degree & Post grad degree)	7,000
No. of Universities & deemed universities	147
No. of Open Universities/open school	5
No. of Schools with vocational courses	12,543
No. of Industrial Training Institutes	2447
No. of Polytechnics	950
No. of Engineering (degree) colleges	200
No. of Engineering (Post graduate degree) colleges	140

Gender Analysis of student population in schools is as under:

	Boys per cent	Girls per cent
Primary	58.0	41.4
Middle	62.6	37.4
High School	66.7	33.3

Part II

STRUCTURE OF THE EDUCATIONAL SYSTEM

The structure of educational system is shown in Charts 1 to 3. Education is a concurrent subject meaning thereby that it is the responsibility of both State Government and Central Government. Primarily the Ministry of Human Resource Development and Ministries of Education at state levels are responsible for education at primary and secondary levels and Post-secondary education up to university level in Sciences, Arts, Engineering, Pharmacy, and Management. Ministry of Health, Ministry of Agriculture, Ministry of Labour are responsible for Medical Education, Agriculture and Fisheries Education, and Vocational Training respectively.

2.1 Pre-School Education

This is organized on the basis of private initiative. It is optional for entry into government schools and is compulsory for most of the private schools. Pre-school education is more popular with the elite and the educated who believe in preparing children for competitive life from early childhood and is predominant in urban areas. More often, the entire cost of education is borne by students. These schools are generally run by various societies and NGOs.

2.2 Primary Education

The primary education spans over 5 years and starts at the age of 5+. The students go through grades or classes 1 to 5 in schools which offer primary education. Most secondary schools in urban areas offer both primary and secondary education while there are a large number of independent primary schools in rural areas. The education at this level is managed by both government and private sectors. Many of the schools run by private sector are also called public schools. Generally, the education in government schools is either free or a very nominal fee is charged from the students. The fee structure in private schools may vary by a factor of 20 or more. Generally, the private schools are funded by the government for most of their running expenditure, while the capital expenditure such as land, buildings is borne by the private organizations. The organizations have the choice of not accepting the grants from government. Though the urban schools have adequate numbers of teachers, it is not uncommon to have very small schools in rural areas with 1 to 5 teachers in a school.

2.3 Secondary Education

The grades or classes 6 to 10 comprise secondary education. Most secondary schools offer education in all the grades from grades 6 to 10. However, in some rural areas, education up to grade/class 8 is offered and these schools are called middle schools. Generally, most schools offer general education, to provide a rounded personality and with bias to science and mathematics. However, a large number of schools offer vocational education in addition to the general education during grades 11 and 12. These cater to the skill development required for the environment from which the students come and prepares the youth for self or wage employment. As in the case of primary education, the middle and secondary schools are managed by government and private sectors. Most of the schools run by private societies receive some grants from the government. All the primary and secondary schools are inspected by inspectors appointed by local/state governments for proper standards and facilities.

2.4 Technician and Vocational Education

The secondary school graduates take different streams of study at post secondary level or join the workforce. The post secondary courses include 2 years vocational certificate course, 3 years technician diploma and a 2 years higher secondary or pre-university course. The technician diploma and vocational courses span a variety of courses, such as Engineering, Stenography, Office Assistant, Architecture, Interior Decoration, Home Science, Agriculture, Fisheries, Medical Lab Technician, etc. and the courses are administered by different ministries such as Human Resources Development/Education, Agriculture, Labour and Health.

The two year Higher Secondary or Pre-University courses lead to University based academic studies spanning a variety of disciplines such as Arts, Humanities, Sciences, Management, Commerce and Business Studies, Engineering, Medicine, Agriculture and Pharmacy. This two year course, called the higher secondary course, is offered at Secondary Schools as grades 11 and 12 and also is offered in the colleges as pre-university course. These courses are mostly academic in nature and prepare students to take up university courses in various specializations.

2.5 University Education

The university education is offered by the professional colleges, general colleges and universities at Bachelors and Masters and Doctoral levels. The colleges are either part of universities or affiliated to universities. The government established colleges, and universities are funded, monitored and guided through an independent body called University Grants Commission. The Commission receives finances from the Government of India. The colleges established by societies are also funded by UGC, if they conform to certain standards and norms in regard to mode of student admission, examinations, fees, etc.

Professional courses catering to the technical education are monitored by a body called All India Council for Technical Education.

Chart 1 Articulation of the Education System

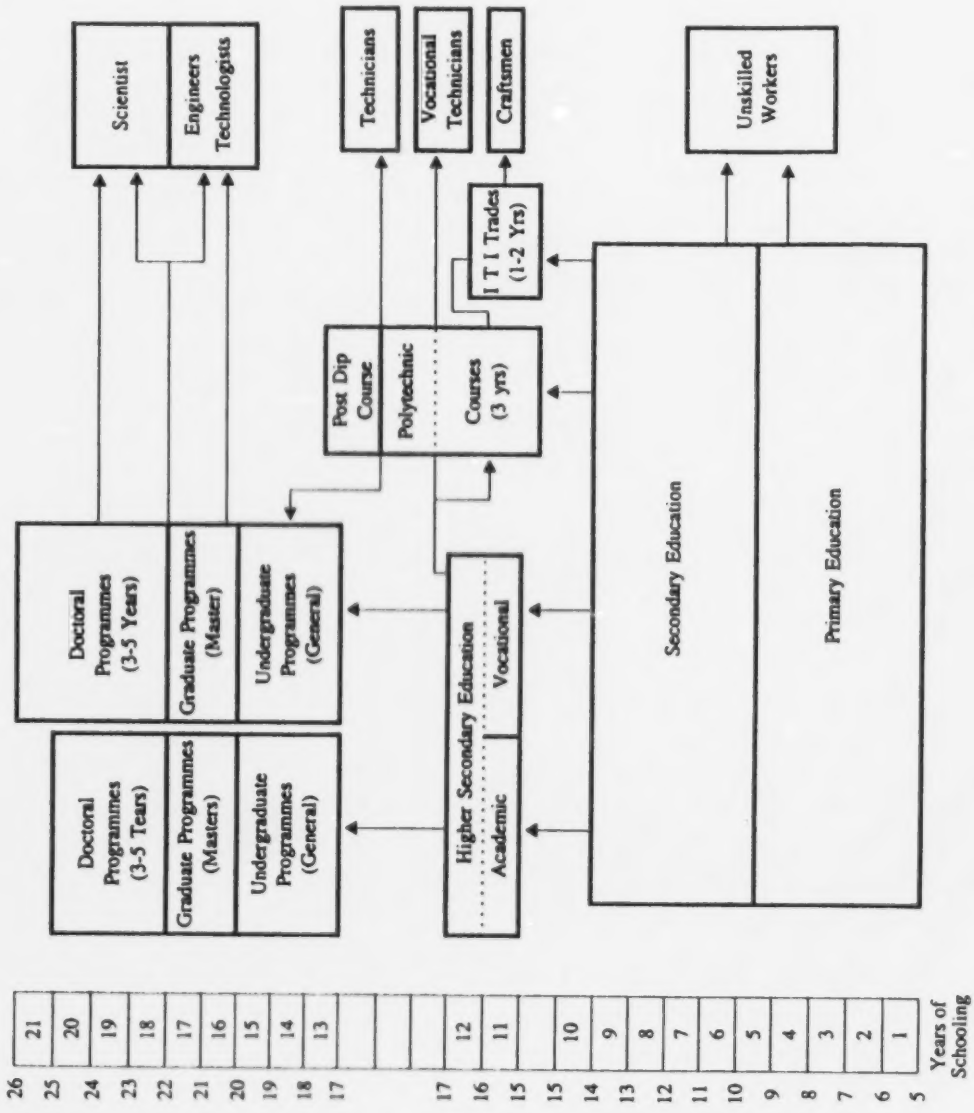
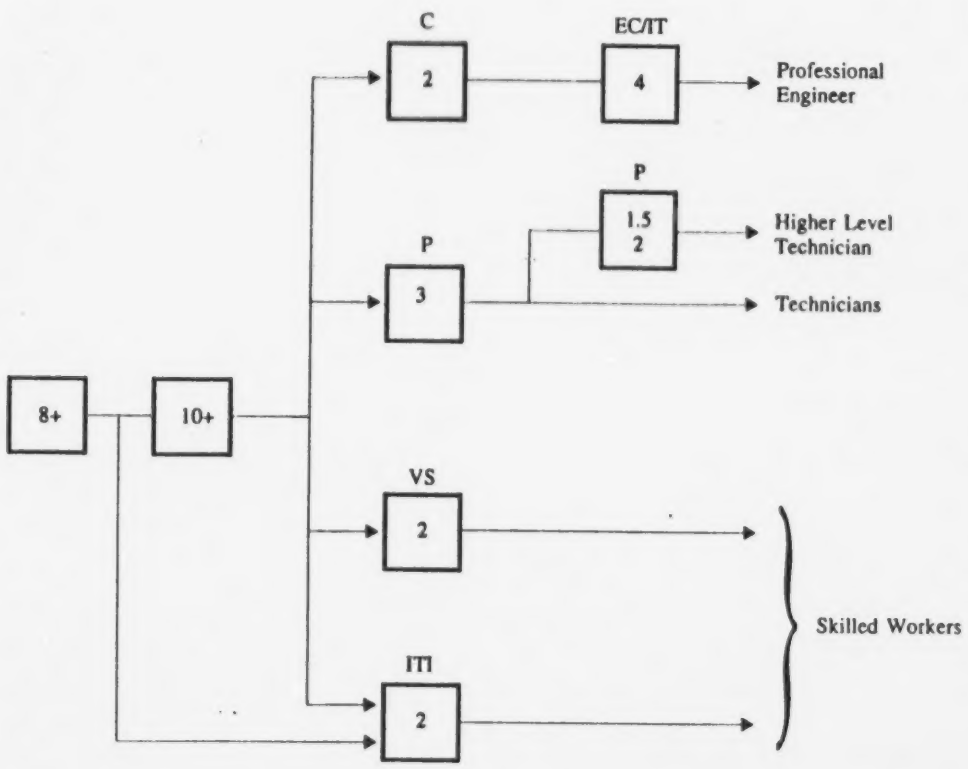


Chart 2 Technician Education System in India



LEGEND

ITI - Industrial Training Institute
VS - Vocational Schools
P - Polytechnics
C - Colleges
EC/IT - Engineering Colleges/Institute of Technology

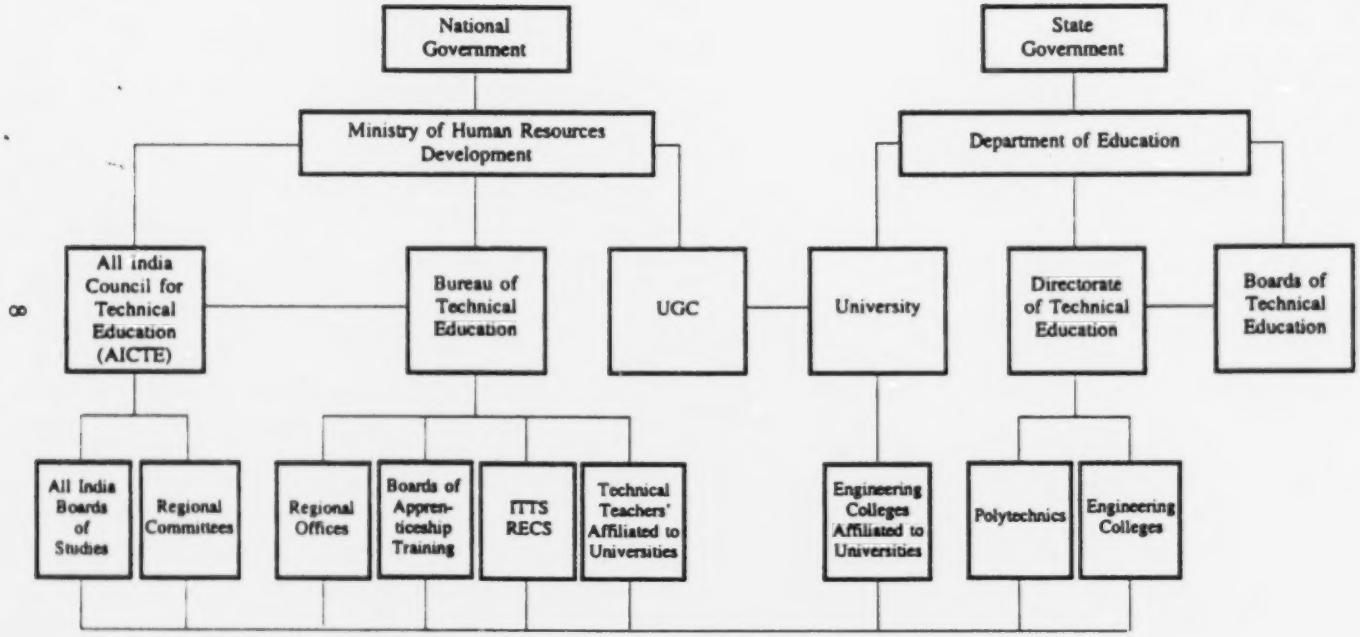


Chart 3 Organizational Structure of Technical Education

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Part III

NATIONAL POLICY ON EDUCATION

(Based on NPE 1986 with modifications undertaken in 1992)

3.1 Introduction

Since the adoption of 1986 policy there has been considerable expansion in educational facilities all over the country. More than 90 per cent of country's rural habitations have schooling facilities within a radius of 1 km. There has been augmentation of facilities at all levels. The 10 + 2 + 3 system has been accepted as a common structure of education throughout the country and has been introduced in most states. A common scheme of studies for boys and girls, incorporation of science and mathematics as compulsory subjects and assignment of importance to work experience are some of the basic features of the common structure. The country considers that human being is a positive asset and national resource which needs to be cherished, nurtured and developed with tenderness and care, coupled with dynamism. The growth of each individual presents different range of problems and requirements and these need to be addressed by the educational system. Education must respond to the national goals of secularism, socialism, democracy and professional ethics which are coming under strain. The rural areas need attention and rural-urban disparities in terms of facilities and employment opportunities need to be reduced. Control of population growth could be achieved through the spread of literacy and education among women. The coming generations should have the ability to internalize new ideas constantly and creatively. They have to be imbued with a strong commitment to human values and to social justice through better education.

3.2 Essence and Role of Education

For an all round development, both material and spiritual education is essential for all members of society. It has an acculturating role. It refines sensitivities and perceptions that contribute to national cohesion, a scientific temper and independence of mind and spirit, thus, furthering the goals of socialism, secularism and democracy enshrined in the constitution. Education develops manpower for different levels of economy. It is the substrate on which research and development flourish and thus is an ultimate guarantee of national self-reliance. Education is a unique investment in the present and future and this is the cardinal principle to the National Policy on Education.

3.3 National System of Education

It implies that education of comparable quality be made accessible to all students irrespective of caste creed, location and sex. It envisages a common 10 + 2 + 3 structure with a national curricular framework. The framework contains a common core along with other flexible components. The common core will include, the history of India's freedom movement, the constitutional obligations and other content essential to nurture national identity and values. To nurture peace and understanding in the world, education must strengthen world perspective, international cooperation and peaceful coexistence. The core curriculum also must create an awareness of equality of all and conditions required for its success. In the higher education and in technical education inter-regional mobility is to be provided and the universal nature of universities and other institutes of higher education is to be underscored. In the areas of Science and Technology and in the field of Research and Development, measures to network the institutions and to involve them in the projects of importance will be taken.

The nation will provide the resource support for implementing the programmes of educational transformation reducing disparities, universalization of elementary education, adult literacy, scientific and technological research, etc. Opportunities for life long education will be provided to all sections of people through thrust in the direction of open and distance learning.

3.4 Education for Equality

The new policy will lay special emphasis on removal of disparities and to equalize educational opportunity by attending to specific needs of those who have been denied equality so far.

a) ***Education for women equality***

Education will be used as an agent of change in the status of women. There will be a well-conceived edge in favour of women and the policy will play a positive and interventionist role in the empowerment of women. Besides emphasis on the removal of women's illiteracy, studies on women's education, promotion of women's education at different levels will be supported. The policy of non-discrimination will be pursued vigorously to eliminate sex stereo-typing in vocational, technical and professional courses and to promote the participation of women in non-traditional occupations as well as in existing and emergent technologies.

b) ***Education of scheduled castes (SC)***

The focus will be on the equalization of SC-population with non-SC population. The measures contemplated include:

1. Incentives and scholarships for studies up to 10th class;
2. Recruitment of teachers from SC-group;

3. Locating schools in convenient places for greater participation of SC-students;
4. Provision of hostels for the SC-students in district headquarters for higher studies;
5. Measures to increase the participation of SC-population in the educational process.

c) ***Education of scheduled tribes***

Opening of more schools in the tribal areas, use of special curricula and use of tribal language for teaching, recruitment of tribal persons for teaching in tribal areas, incentives and scholarships, special remedial courses, emphasis on the cultural heritage of the tribes, etc. will be the main focus.

d) ***Minorities***

Minority groups which are deprived or backward will be paid special attention. Establishment of Institutes which protect their language and culture will be encouraged.

e) ***Handicapped***

The education for the handicapped has the objective of integrating physically and mentally handicapped with general community as equal partners, to prepare them for normal growth, and to enable them to face life with courage and confidence. The measures include:

i) where possible integrate the education of children with motor and minor handicaps with normal children;

ii) establish more schools with hostels for severely handicapped;

iii) include adequate vocational training in the curriculum;

iv) encourage voluntary organizations to promote the cause of education of handicapped.

f) ***Adult education***

The crucial element of adult education is adult literacy through literacy programmes. The eradication of illiteracy in the age group 15-35 is one of the objectives. Comprehensive programmes for post-literacy and continuing education of neo-literate and youth to improve their living and working conditions will be organized. This implies organization of employment/self-employment oriented, need and interest based vocational and skill training programs.

3.5 Reorganization of Education

Elementary education will have three thrusts namely universal access and enrollment, universal retention of child in the school till 14 years of age, and

improvement in the quality of education. The education will have child centered approach. Every school will have all weather classrooms, library, maps, charts, toys etc. At least 50 per cent of teachers will be women. Non-formal education to the dropouts will be provided and attractive learning material will be used.

3.6 Secondary Education

Secondary education is the backbone of the educational system. It begins to expose the students to the differentiated roles of science, humanities and social sciences. It provides children with a sense of history and national perspective. Computer literacy will be a key area. A proper understanding of work ethics and the values for human and composite culture will be brought out through appropriately formulated curricula. Vocationalization through specialized institutions and reshaping secondary education will at this stage provide valuable manpower for economic growth. Pace setting Navodaya Vidyalayas (schools) open up scope for innovation and experimentation. The broad aim of these institutions is excellence coupled with equity and social justice, promotion of national integration.

3.7 Vocationalization

Systematic, well planned and rigorously implemented programmes of vocational education are meant to develop a healthy attitude amongst students towards work and life, to enhance individual employability, to reduce the mis-match between the demand and supply of skilled manpower, and to provide an alternative for those intending to pursue higher education without particular interest or purpose. Efforts will be made to provide children at the higher secondary level with generic vocational courses which cut across several occupational fields and which are not occupation specific.

Vocational Education will be a distinct stream, at post secondary stage intended to prepare students for identified occupations spanning several areas of activity but may be made available after class 8.

Health planning and health service management should optimally interlock with the education and training of appropriate categories of health manpower through health-related vocational courses. Health education at the primary and middle levels will ensure the commitment of the individual to family and community health, and lead to health-related vocational courses at the +2 stage of higher secondary education. Efforts will be made to devise similar vocational courses based on Agriculture, Marketing, Social Services, etc. Emphasis in vocational education will also be on development of attitudes, knowledge, and skills for entrepreneurship and self-employment.

The establishment of vocational courses or institutions will be the responsibility of the Government as well as employers in the public and private sectors; the government will, however, take special steps to cater to the needs of

women, rural and tribal students and the deprived sections of society. Appropriate programmes will also be started for the handicapped.

Graduates of vocational courses will be given opportunities, under predetermined conditions, for professional growth, career improvement and lateral entry into courses of general, technical and professional education through appropriate bridge courses.

Non-formal, flexible and need-based vocational programmes will also be made available to neoliterates, youth who have completed primary education, school drop-outs, persons engaged in work and unemployed or partially employed persons. Special attention in this regard will be given to women.

Tertiary level courses will be organized for the young who graduate from the higher secondary courses of the academic stream and may also require vocational courses.

It is proposed that vocational courses cover 10 per cent higher secondary students by 1995 and 25 per cent by 2000. Steps will be taken to see that a substantial majority of the products of vocational courses are employed or become self-employed. Review of the courses offered would be regularly undertaken. Government will also review its recruitment policy to encourage diversification at the secondary level.

3.8 Higher Education

Higher education provides an opportunity to reflect on the critical social, economic, cultural, moral and spiritual issues facing humanity. It contributes to national development through dissemination of specialized knowledge and skills.

In the context of the unprecedented explosion of knowledge, higher education has to become dynamic as never before, constantly entering uncharted areas. Hence, the main emphasis will be on the consolidation of, and expansion of facilities in, the existing institutions.

Creation of autonomous colleges and departments within universities on a selective basis will be encouraged.

Provision will be made for minimum facilities and admission will be regulated according to capacity. Extensive use of educational technology and electronic media for improvement of teaching is planned.

Research in the universities will be provided enhanced support and steps will be taken to ensure its high quality. Suitable mechanisms will be set up by the UGC for coordinating research in the universities, particularly in thrust areas of science and technology, with research undertaken by other agencies. An effort will be made to encourage the setting up of national research facilities within the university system, with proper forms of autonomous management.

3.9 Open University and Distance Learning

The open learning system has been initiated in order to augment opportunities for higher education, as an instrument of democratizing education and to make it a lifelong process. The flexibility and innovativeness of the open learning system are particularly suited to the diverse requirements of the citizens, including those who had joined the vocational stream.

The Indira Gandhi National Open University, established in 1985 in fulfillment of these objectives, will be strengthened. It would also provide support to establishment of open universities in the States.

The National Open School will be strengthened and open learning facilities extended in a phased manner at the secondary level in all parts of the country.

3.10 De-linking Degrees from Jobs

A beginning will be made in de-linking degrees from jobs in selected areas. De-linking will be applied in services for which a university degree need not be a necessary qualification. Its implementation will lead to a re-fashioning of job-specific courses and afford greater justice to those candidates who, despite being equipped for a given job, are unable to get it because of an unnecessary preference for graduate candidates. Appropriate machinery will be established to determine the suitability of candidates for specific jobs based on comparable competencies across the nation.

3.11 Technical and Management Education

Although the two streams of technical and management education are functioning separately, it is essential to look at them together, in view of their close relationship and complementary concerns. The reorganization of Technical and Management Education should take into account the anticipated scenario by the turn of the century, with specific reference to the likely changes in the economy, social environment, production and management processes, the rapid expansion of knowledge and the great advances in science and technology.

The infrastructure and services sectors as well as the unorganized rural sector also need a greater induction of improved technologies and a supply of technical and managerial manpower.

In order to improve the situation regarding manpower information, the recently set up Technical Manpower Information Systems will be further developed and strengthened.

Continuing education, covering established as well as emerging technologies, will be promoted.

As computers have become important and ubiquitous tools, a minimal exposure to computers and a training in their use will form part of professional

education. Programmes of computer literacy will be organized on wide scale from the school stage.

In view of the present rigid entry requirements to formal courses restricting the access of a large segment of people to technical and managerial education, programmes through a distance-learning process, including use of the mass media, will be offered. Technical and management education programmes, including education in polytechnics, will also be on a flexible modular pattern based on credits, with provision for multi-point entry. A strong guidance and counselling service will be provided.

In order to increase the relevance of management education, particularly in the non-corporate and under-managed sectors, the management education system will study and document the Indian experience and create a body of knowledge and specific educational programmes suited to these sectors.

Appropriate formal and non-formal programmes of technical education will be devised for the benefit of women, the economically and socially weaker sections, and the physically handicapped.

The emphasis of vocational education and its expansion will need a large number of teachers and professionals in vocational education, educational technology, curriculum development, etc. Programmes will be started to meet this demand.

To encourage students to consider "self-employment" as a career option, training in entrepreneurship will be provided through modular or optional courses, in degree or diploma programmes.

In order to meet the continuing needs of updating curricula, renewal should systematically phase out obsolescence and introduce new technologies of disciplines.

3.12 Institutional Thrusts

Some polytechnics in the rural areas have started training weaker groups in those areas for productive occupations through a system of community polytechnics. The community polytechnic system will be appropriately strengthened to increase its quality and coverage.

3.13 Innovation, Research and Development

Research as a means of renovation and renewal of educational processes will be undertaken by all higher technical institutions. It will primarily aim at producing quality manpower capable of taking up R & D functions. Research for development will focus on improving present technologies, developing new indigenous ones and enhancing production and productivity. A suitable system for watching and forecasting technology will be set up.

The scope for co-operation, collaboration and networking relationships between institutions at various levels and with the user systems will be utilized.

Proper maintenance and an attitude of innovation and improvement will be promoted systematically.

3.14 Promoting Efficiency and Effectiveness at all Levels

As technical and management education is expensive, the following major steps will be taken for cost-effectiveness and to promote excellence:

a) High priority will be given to modernization to enhance functional efficiency and to the removal of obsolescence.

b) Institutions will be encouraged to generate resources using their capacities to provide services to the community and industry. They will be equipped with up-to-date learning resources, library and computer facilities.

c) Adequate hostel accommodation will be provided, specially for girls. Facilities for sports, creative work and cultural activities will be expanded.

d) More effective procedures will be adopted in the recruitment of staff. Career opportunities, service conditions, consultancy norms and other pre-requisites will be improved.

e) Teachers will have multiple roles to perform: teaching, research, development of learning resource material, extension and managing the institution. Initial and in-service training will be made mandatory for faculty members and adequate training reserves will be provided. Staff Development Programmes will be integrated at the State and coordinated at Regional and National levels.

f) The curricula of technical and management programmes will be targeted on current as well as the projected needs of industry or user systems. Active interaction between technical or management institutions and industry will be promoted in programme planning and implementation, exchange of personnel, training facilities and resources, research and consultancy and other areas of mutual interest.

g) Excellence in performance of institutions and individuals will be recognized and rewarded. The emergence of substandard and mediocre institutions will be checked. A climate conducive to excellence and innovation will be promoted with full involvement of the faculty.

h) Selected institutions will be awarded academic, administrative and financial autonomy of varying degrees, building in safeguards with respect to accountability.

i) Networking systems will have to be established between technical education and industry, R & D organizations, programmes of rural and community development, and with other sectors of education with complementary characteristics.

3.15 Management Functions and Change

In view of the likely emergence of changes in management systems and the need to equip students with the ability to cope with them, effective mechanisms will be devised to understand the nature and direction of change per se and to develop the important skill of managing change.

In view of the integrated nature of the task, the Ministry of Human Resources Development will coordinate with balanced development of engineering, vocational and management education as well as the education of technicians and craftsmen.

Professional societies will be encouraged and enabled to perform their due role in the advancement of technical and management education.

Private and voluntary organizations will be involved in this sector of education in conformity with accepted norms and standards. Commercialization of Technical and Vocational Education will be curbed for many valid reasons.

3.16 Reorienting the Content and Process of Education

a) ***Cultural Perspective***

Education must bring about the fine synthesis of change oriented technologies and the country's continuation of cultural tradition. The curricula and process of education will be enriched by cultural content and children will be enabled to develop sensitivity to beauty, harmony and refinement. To sustain & carry forward the cultural tradition, the role of old masters, who train pupils through traditional modes will be supported. Linkages between university system and traditional schools of higher learning in art, archeology and oriental studies, etc. will be established.

b) ***Value education***

Education should foster universal and eternal values oriented towards unity and integration of people based on our heritage, national and universal goals and perceptions.

c) ***Media and Educational Technology***

Since media (films, TV programmes) have a great influence on the society, steps will be taken to discourage such trends which militate against the educational objectives such as violence, crime, consumerism. The potential of Educational Technology and modern electronic media will be fully harnessed to provide quality of education, sharpen awareness of art and culture and inculcate abiding values, etc.

d) ***Work Experience***

Work experience will be organized as an integral part of the learning process at all levels. This will provide linkages with society, prepare the student with right values and help in necessary orientation for the entry into workforce.

e) ***Environment***

Environmental consciousness will be developed at all stages and will be integrated in the entire educational process.

f) ***Mathematics and Science Education***

Mathematics and Science education will be given emphasis. The teaching of mathematics will be redesigned to introduce the use of technological devices like computers. Science education will be oriented to problem solving and decision making skills. The science education will be linked to daily lives, environment and to the vast society around.

g) ***Others***

Plans are on the anvil to improve the evaluation process and bringing examination reforms. Appropriate steps will be taken to strengthen teacher education. Adequate attention will be paid to teacher recruitment, service conditions and teacher evaluation.

3.17 Management of Education

High priority will be given to overhauling the planning and management function. Some guiding consideration will be to :

1. Introduction of long term planning;
2. Creation of autonomous institutions;
3. Involvement of people from non-governmental and voluntary agencies in the management of educational Institutions
4. Introducing more women into planning and management functions.

Part IV

MANAGEMENT AND FINANCING OF TECHNICAL EDUCATION SYSTEM

The Department of Education is one of the constituents of Ministry of Human Resource Development and under the overall charge of Minister of Human Resource Development. The secretariat of the department is headed by Secretary and assisted by an Additional Secretary and an Educational Adviser (Technical).

A number of autonomous organizations have been established by the Department for various purposes. Some of the important ones are:

4.1 Autonomous Organizations

National Council for Educational Research and Training (NCERT), is a National level Resource Institution operating in the school sector. It formulates policies related to school education, plans for the implementation of policies and supports implementation of plans. It develops instructional materials, trains teachers and administrators in the school education system.

The National Institute of Educational Planning and Administration (NIEPA) specializes in the area of Educational Management.

University Grants Commission (UGC) co-ordinates, sets standards, funds and monitors the higher education.

4.2 All India Council for Technical Education

The All India Council for Technical Education co-ordinates and sets standards in the area of Technical and Management Education. It has been established as a premier body at the National Level for the growth, development and control of technical education. AICTE has a number of regional committees and boards to assist it in various functions. One of the Boards, the Board of Technician Education (BTE) looks into the development needs of the Polytechnic Education. The other boards are for undergraduate studies, Post-graduate studies and Management Education. A few other boards are being created. Chart 4 shows its organizational structure.

4.3 Technical Teachers Training Institutes

Technical Teachers Training Institutes were established as resource institutions for the Technician Education System in the country. There are four Institutes, each catering to the needs of a region. These Institutes help Department of Education and other bodies to develop policies, plan the implementation of policies

and support the implementation of plans. They also train polytechnic teachers, develop curricula and instructional materials and conduct R & D for Technician Education.

4.4 National Project Implementation Unit

In order to support the development of polytechnics under the World Bank funded project for technician education, a new body, National Project Implementation Unit (NPIU) was created. It co-ordinates, monitors, supports all the activities taken up under World Bank project in all the Polytechnics. It is supported by State Project Implementation Unit (SPIU) established at each of the participating states.

The Polytechnics are under the administrative control of state governments. At the state level, the state Directorates of Technical Education (DTE) are the funding and administering agencies of Polytechnics. In some states, the Directorates are complimented by Boards of Technical Education. These boards have academic functions like curriculum development, conduct of examinations, institutional evaluation, accreditation and certification. In states where the boards do not exist, these functions are taken care by the Directorate of Technical Education.

Financing of Technical Education is undertaken by central government, state governments and private organizations. The government funds come under two heads: Plan and Non-plan expenditures. The plan funds are utilized for new projects and programmes. The Non--plan funds cover the expenditures on on-going programmes and existing Institutes. The funding pattern for the 8th five-year plan and the year 92-93 is given in table below:

Funding for 8th Five-Year Plan from Government

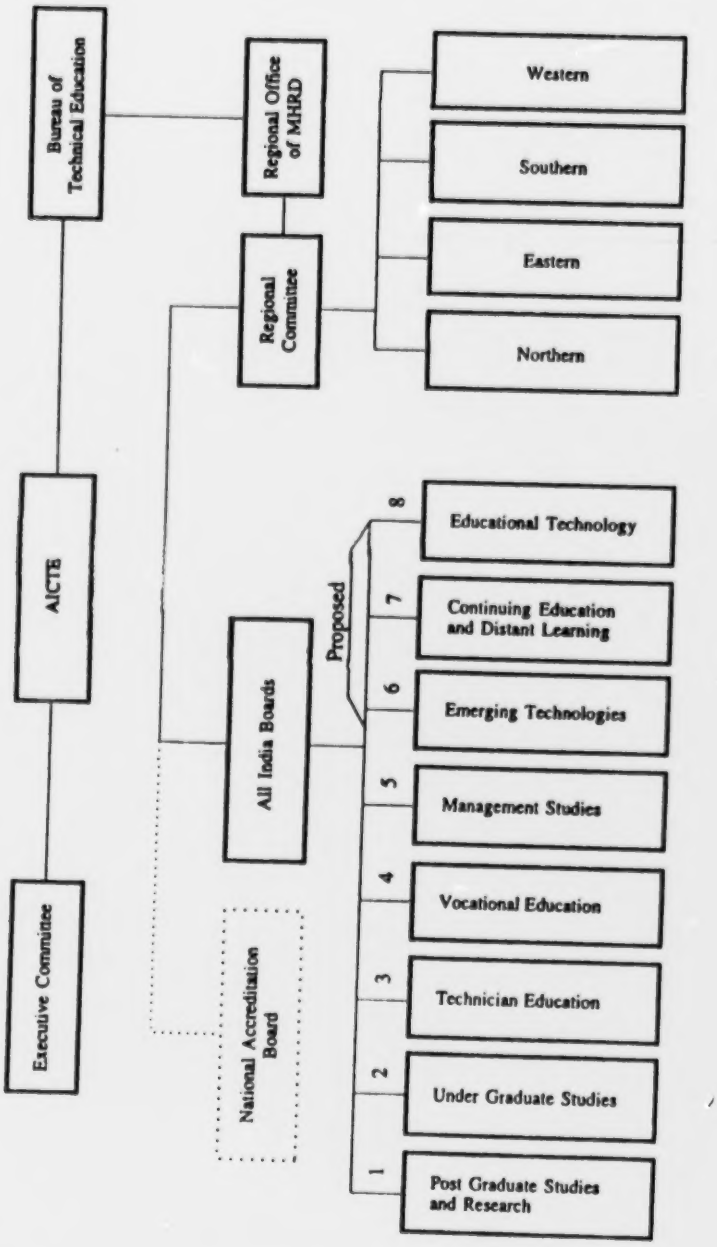
Sector	Centre in millions of US$	State in millions of US$	Total
1. Elementary Education	960	2019	2979
2. General Education	780	1248	2028
3. Adult Education	467	131	598
4. Technical Education	275	654	929
5. Total	2481	4052	6533

Funding for 1992-93 from Government

Sector	Centre in millions of US$	State in millions of US$	Total
1. Elementary Education	947	3093	4040
2. General Education	1260	1923	3183
3. Adult Education	400	269	669
4. Technical Education	566	1356	1922
5. Total	3173	6641	9814

Presently, the major share of funding comes from the government. Even though the private participation has been high during the last decade, the trend is not very encouraging as sub-standard institutions were set up and run with a profit motive.

Chart 4. AICTE and Its Organizations



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Part V

TECHNICIAN EDUCATION SYSTEM

5.1 Historical Development of Polytechnic Education

The history of polytechnic education in India can be traced back to over 150 years. Between 1830 - 1850, four Engineering Schools were started to train the upper and lower subordinate staff, overseers, sub-overseers and draftsmen for the Public Works Department, local funds, municipalities, etc. of the provincial government.

These diploma institutions were primarily established by the British Government in order to meet the requirement of technical personnel for the limited infrastructure existing at that time and proposed to be created to fulfil the objectives of the colonial regime. ' In 1947, there were 53 institutions offering diploma programmes in a limited number of disciplines. The total intake was less than 4,000 per year.

In the last four decades, since independence, the polytechnic education witnessed a phenomenal expansion with the number of institutions increasing by nearly 20 times to about 950 of which 500 are recognized by AICTE. Majority of the remaining institutions came up in the 1980s as self-financing institutions. The annual intake in the polytechnics is around 100,000 with diploma offerings in more than 100 disciplines.

During the 1950s, the emphasis was more on expansion and creation of Polytechnic education facilities to meet the needs of rapid industrialization. The major thrust was on creation of a strong infrastructure in science and technology that could support rapid industrialization. This policy of the Government was implemented through successive Five Year Plans after independence. The major objective of industrialization was to make the country self reliant in many technological areas like production, manufacturing, construction, power generation, water resources management, transportation, etc.

Polytechnic education has responded to the challenges of industrialization for self-reliance through:

a) capacity expansion, by increasing the number of polytechnics and intake.

b) diversification, by offering courses in various disciplines to cater to the needs of the industry and other employment sectors.

c) starting advanced and post-diploma courses.

d) starting courses in special technological areas like leather, textile, printing, etc.

e) providing increasing opportunities for women in technical education by opening polytechnics exclusively meant for women.

Tables 1 and 2 show the growth of polytechnics in India together with the annual intake and out turn and stock of diploma holders since independence.

Table 3 shows the statewise distribution of diploma level institutions in India in the year 1992.

Table 1. Growth of Polytechnics in India
(ISTE Data)

Year	No. of polytechnics	Intake per year	Out turn per year
1947	53	3,670	1,800
1960	195	26,000	16,500
1970	309	43,500	24,300
1980	332	49,000	27,000
1986	746	115,000	56,800
1992	948	124,000	73,100

Table 2. Approximate Stock of Diploma Holders
(ISTE Data)

Year	Stock of Diploma Holders
1947	20,000
1955	36,000
1965	101,000
1975	285,000
1985	476,000
1992	782,000

From the late 1960s, the emphasis has shifted from expansion to:

i) consolidation;

ii) optimum utilization of existing facilities;

iii) expansion of facilities in areas where weaknesses exist;

iv) creation of infrastructure in areas of emerging technologies vital for the development of the country;

v) improvement of quality and standards of education;

vi) furtherance of national efforts to develop and apply science and technology as instruments for the country's socio economic development.

Table 3. Statewise Distribution of Diploma Level Institution in India
(ISTE Data - 1992)

Sl No.	State/U.T	Number of Diploma Level Institutions			Intake/Year
		Govt. and Govt.-aided	Self-financing	Total	
1	Andaman Islands	1	-	1	120
2	Arunachal Pradesh	1	-	1	250
3	Andhra Pradesh	60	18	78	9,250
4	Assam	14	-	14	1,420
5	Bihar	23	-	23	3,450
6	Chandigarh	3	-	3	270
7	Dadra Nagar Haveli	1	-	1	90
8	Delhi	16	-	16	3,400
9	Goa	5	-	5	600
10	Gujarat	38	-	38	5,850
11	Haryana	14	-	14	1,780
12	Himachal Pradesh	4	-	4	320
13	Jammu and Kashmir	5	-	5	390
14	Karnataka	41	142	183	19,100
15	Kerala	30	-	30	3,600
16	Madhya Pradesh	40	-	40	5,650
17	Maharashtra	65	115	180	22,700
18	Manipur	2	-	2	240
19	Meghalaya	1	-	1	150
20	Mizoram	2	-	2	120
21	Nagaland	1	-	1	100
22	Orissa	11	4	15	1,290
23	Pondicherry	3	-	3	380
24	Punjab	16	-	16	2,280
25	Rajasthan	20	-	20	1,340
26	Sikkim	1	-	1	120
27	Tamil Nadu	56	76	132	21,600
28	Tripura	1	-	1	120
29	Uttar Pradesh	89	-	89	13,400
30	West Bengal	29	-	29	4,800
		593	355	918	124,180

5.2 Present Polytechnic Education System

Polytechnic education falls in the concurrent list. The system is mainly managed by the state agencies as per the state policies. Central intervention was initiated particularly for quality improvement in polytechnics whenever such a need arose.

a) *Target Population*

The entry qualifications prescribed for diploma programmes in most of the states is 10+. A few states have recently prescribed entry qualifications as 10 + 2.

Majority of students seeking admission to the diploma courses come from comparatively poor socio-economic background, from both rural and urban areas. Presently, some states have a Joint Entrance Test (JET) for admission to diploma programmes.

b) Regional Distribution of Polytechnics

Table 4 given below shows the distribution of polytechnics in the country, region wise. The total intake per year, the population and the intake unit of population are also given region wise.

Table 4

Region	Number of Institutions	Total Intake Per Year	Population in millions	Intake per million of population
Northern	165	23,180	228	101.2
Southern	455	58,730	164	358.2
Eastern	62	7,380	218	339.0
Western	254	34,890	187	186.6

c) Course offerings

Most of the polytechnics (about 80%) in the country offer three year generalized diploma courses in conventional disciplines such as Civil, Electrical and Mechanical Engineering. During the last two decades many polytechnics started offering courses in other disciplines such as Electronics, Computer Science, Medical Lab. Technology, Hospital Engineering, Architectural Assistantship, etc. In addition, many single technology institutions also were established in areas like Leather Technology, Sugar Technology, Beauty Culture, Textile Design, etc. Polytechnics also offered post-diploma and advance diploma programmes of 1-2 years duration in different specializations.

d) Instructional Methods

The instructional strategy employed in the polytechnics is predominately classroom-based teaching. Laboratory practices are conducted as per requirements in specific subjects. Many of the polytechnics have acquired adequate audio visual

hardware through special schemes of the central government. However, adequate amount of courseware/software is not available, thus hampering the use of these media.

e) Equipment and Facilities

Many of the polytechnics in the country were established about 30 years ago and the infrastructure facilities in terms of buildings and equipment provided at that time continue to be used in the polytechnics. Changes in technology and field practices call for corresponding changes in equipment and laboratory facilities. Due to resource constraints, most of the facilities have not been updated adequately. The Government of India has been providing grants under direct central assistance to keep the polytechnics updated. The present World Bank assisted project has the objective of modernizing the facilities, resources and courses of polytechnics.

f) Community Polytechnics

In the latter half of the 70's, about 35 polytechnics were identified as Community Polytechnics and provided funds under Direct Central Assistance Scheme to take up activities relating to development of rural areas. The Community Polytechnics were expected to perform activities like: rural technical manpower development, transfer of technology and other technical services needed by the community. Later, the Government of India also provided funds to selected institutions to develop Centres for the Development of Rural Technologies (CDRTs). CDRTs are expected to take up research activities in the area of appropriate technology and develop technologies and devices for improvement in productivity and growth of rural economy. At present, there are about 180 institutions designated as Community Polytechnics. A number of these institutions have performed well in the area of manpower development and transfer of technology.

g) World Bank Assisted Project

In the year 1990, the Government of India with the help of State Governments, developed a scheme for financing polytechnic education with the assistance of World Bank. Massive investment of the order of $600 million is envisaged in two phases covering almost all the AICTE recognized polytechnics in the country. Under the World Bank assisted schemes, the institutions will have projects of (i) capacity expansion to develop new institutions and programmes, (ii) quality improvement for modernization and removal of obsolescence, staff development, etc. and (iii) efficiency improvement whereby the management structures at different levels will be strengthened and maintenance cells established. The major constraints in the development of polytechnic education, that of funding, has been removed with the start of the World Bank assisted projects.

h) Technical Teachers' Training Institutes

The four Technical Teacher's Training Institutes at Bhopal, Calcutta, Chandigarh and Madras were established in 1967 by the Government of India with the major aim of catering to improvement in polytechnic education and continuously

enhancing its efficiency and effectiveness. For this purpose, these institutions conducted programmes and undertook activities in the areas of teacher training, curriculum development, admission tests and examination reforms, promotion of educational research, extension services to States, Polytechnics, Industries and Community and Management development. TTTIs have continuously assessed the needs of the States through surveys and consultations and also have benefited from the directions of the two Review Committees constituted to assess their performance.

TTTIs have been offering a variety of long term and short term training programmes in the areas of engineering/technology, instructional methodologies and techniques and educational management. The bulk of training programmes for polytechnic faculty is organized by them.

The curriculum development activity has contributed to the adoption of systematic approaches to development of job-related technical programmes with the involvement of teachers from polytechnics and other technical institutions as well as professionals from industry.

In the area of instructional material development, TTTIs have developed a variety of instructional materials both print and non-print; print materials such as textbooks, laboratory manuals, workbooks, databook, etc. and non-print materials like video films, computer-assisted learning packages, charts, OHP transparencies, models, slides, film strips, tape-slide programmes, experimental boards, teaching kits and multimedia packages.

TTTIs have constantly involved industries in their activities and promoted the interaction of industries with the polytechnics. Promotion of entrepreneurship in polytechnic students is another area where TTTIs have contributed significantly to promote self-employment among polytechnic products.

i) Other Supporting Agencies

There are many other professional bodies and agencies who directly or indirectly support polytechnic education. The Institution of Engineers and associate membership of the Institution of Engineers (AMIE) has been one of the avenues for diploma holders to upgrade their qualifications. Recently, some states have made arrangements with engineering colleges to admit Diploma holders to engineering degree programmes in an extended period of three years. The Institution of Electronics and Tele-Communication Engineers, in addition, provides some post-graduate diploma programmes in Computer Science and Electronics. ISTE, DST, DOE, Computer Society of India (CSI), also have programmes to support polytechnic education. The Apprenticeship Boards have programmes to provide industrial training to polytechnic teachers and also provide apprenticeship training to polytechnic passouts. Many industries and industry organizations have contributed in a significant measure to the development of polytechnic education.

The Colombo Plan Staff College for Technician Education, conducts training programmes for technician teachers and administrators. Polytechnic education had also the benefit of international inputs through fellowship training programmes and

UNDP assisted projects for upgradation in specific areas. Presently, a massive input is coming to the polytechnic education system through the World Bank Assisted Project.

j) Strengths of the Polytechnic System

The polytechnic education system has witnessed an unprecedented expansion during the last four decades. A huge infrastructure is available in terms of about 500 recognized institutions, and about 450 self-supporting institutions offering programmes in nearly 100 disciplines. The intake capacity is of the order of 100,000. The diploma holders who graduated from the polytechnics 3-4 decades ago occupy senior positions in the industrial sector, and have contributed significantly to the industrialization efforts of the country. The infrastructure in terms of physical facilities and equipment is worth about $1 billion at current prices. There are nearly 25,000 teachers in polytechnics. The infrastructure, expertise and student population is a great source of strength.

Part VI

VOCATIONAL EDUCATION AND TRAINING SYSTEM

Vocational training in India started as far back as 1941. The national policy for vocational training was framed by the government with the advise of National Council for Vocational Training (NCVT) and Central Apprenticeship Council (CAC). The responsibility for implementation of the Vocational Training Policies has been assigned to the Directorate General of Employment and Training (DGE&T). All these organizations are attached with Ministry of Labour.

Under this scheme a network of 2,447 industrial training institutes/centres spread all over the country provide training in 40 Engineering and 22 Non-Engineering trades to about 390,000 persons. The ITIs are under the administrative control of the respective state governments. The DGET under the aegis of NCVT deals with all the matters relating to standards, trade testing and certification. A certificate called National Trade Certificate is awarded to persons who successfully complete a course. It is awarded on behalf of NCVT.

The entry qualifications for the certificate courses vary from class/grade 8 to 10 and the duration of the courses vary from 1 year to 4 years depending upon the nature of the course. Advanced Training Institutes (ATI) and Central Training Institute (CTI) provide necessary support to the system in training the ITI teachers.

The vocational education is also complemented by the secondary school system under the Ministry of Human Resource Development. The school system has introduced vocational education at grades 11 and 12 in higher secondary schools.

Part VII

CHALLENGES AND FUTURE PERSPECTIVES

7.1 Economic Scenario

a) *Agricultural Sector*

Indian economy is predominantly agriculture based and contributes to 30 per cent of GDP and 10 per cent of the exports. Though the agricultural production has increased three and half times over the past four decades, it has to meet an additional 70 million tons due to population increase by 2000 AD with a projected loss of 180 million hectares of agricultural land. Thus, besides the efforts in agricultural practices and genetic engineering to increase crop yields, it must pay more attention to post harvest technology, food processing, packaging and preservation, recycling of wastes, etc.

b) Industrial Sector

The country had a highly protected economy till 1991 and its share in world economy was less than 1 per cent. The low production, productivity and quality is due to their protected nature and lack of competition.

With the break-up of the Soviet Union and the integration of the European common market and South-East Asian economies , the country faces a great challenge to improve industrial production both quantitatively and qualitatively to augment exports.

Besides the contribution of industry to GDP and to exports, industry plays a vital role as the engine of growth, stimulating all developmental activities.

The Indian industry needs to have a high level of diversification and expansion and should particularly concentrate on the manufacture of value-added products rather than export of raw materials. It needs to adopt and adapt technologies suiting to the local manufacturing conditions. This will have a great implication on variety, number and quality of technical manpower needed for the industrial sector. A high level of upgradation in skills is called for if the industry is to be competitive in the world market.

This calls for a drastic change in the orientation of the industrial sector so as to be competitive both in the domestic and international markets. The knowledge, competency and skill profiles of future technical manpower will have to be correspondingly enhanced by changes in the technical education system at all levels. The existing technical manpower will also need extensive reorientation to meet these requirements.

c) Infrastructure and Service Sectors

The development of infrastructure and service sectors is crucial to industrial development and the key sectors like transportation, power generation and distribution, communication and water resource development were essentially with the government. One of the major changes envisaged for the development of these sectors is to allow private participation in most of these sectors in order to mobilize resources for the overall development of these key sectors. Improvement in production and productivity in these sectors and increasing the efficiency by the use of high technologies, calls for development of technical manpower capable of adopting and adapting these technologies in the Indian context. These are the priorities. The technical education system will have to correspondingly introduce updated courses in these areas for developing appropriately trained manpower at all levels.

d) Information and Computer Technology

Industrial and economic development cannot take place unless sufficient information base has been built and the requisite information is made available on time. The information concerning resources available, technologies practiced, production standards, sales and marketing are to be well documented to enable the industries to take advantage of the incentives for improved productivity, quality and technology improvement. The developments in information technology and computer applications need to be adopted by the Indian industrial sector. Increased use of information technologies and computers is required for improving industrial efficiency and productivity. This calls for well-trained manpower to set up information databases, retrieve and process information effectively and efficiently for taking day to day decisions and for long range planning. The education and training of manpower in information and computer technology needs to be strengthened and quality improved to meet the challenges of the present information era.

7.2 New Economic and Industrial Policies

a) *Economic policy*

Since 1991, Indian economy is undergoing large structural changes as a result of the changes taking place in the global economy. Sweeping market oriented reforms in industry, foreign trade and investment were introduced to liberalize the economy.

The following major economic policy initiatives are being implemented:

i) Free market economy will replace the regulated economy of the past.

ii) Public sector industrial units which are sick and a high drain on the public exchequer will be closed down.

iii) There will be more free entry of the private sector in many new industrial production areas and infrastructure.

iv) Foreign capital and investment including foreign technology transfer will be encouraged in the Indian market. Restrictions on the investment areas are removed.

v) Channels will be opened up for entry of resources from the parallel economy (black money), into fruitful investment.

These developments in economy will hopefully set in motion a series of structural changes in trade, industry and finance and will boost the economy for sustained growth.

In order to bring in necessary changes, the government has brought out a new industrial policy in 1991 which removes many of the restrictions placed on private industry and investors.

7.3 Meeting Requirements of Sectors of Economy

a) International Competitiveness

A major component that will help to increase production and productivity is the quality of technical manpower employed by the industry. Industry will have to demand and contribute in training highly competent technical manpower at various levels, in order that this modernization programme can succeed. The existing manpower in the industry will have to be retrained and re-oriented to modern technology, production techniques, production practices, testing, quality control, marketing, sales, etc. The industrial production will have to undergo a manifold increase in quantity and quality for the world market and increase its share of the world trade.

b) Improving Quality of Life

Seventy per cent of the population lives in about 500,000 villages. All the industrialization and economic reforms will have to improve the quality of life of these people through provision of shelter, drinking water, electrical power, sanitation, transportation, communication and on environment that promotes fruitful socio-cultural activities. To respond to the needs of people living in these villages, appropriate technologies that fit in with the development needs of the villages are to be developed. This means that the focus of education, training, research and development must include the needs of the people living in villages.

c) Environmental Concerns

Unplanned large scale industrialization and other developmental activities are likely to lead to ecological disaster with depletion of forest resources, loss of genetic diversity, degradation of soils, depletion of fossil fuels, massive pollution of biosphere elements like land, water and air and exploding human population.

Since sustainable development is that which meets the present needs without compromising the ability of future generations to meet their own needs, it must be integrated into the developmental strategies. Sustainable development is a challenge

to scientific and technological research and development. Environmental studies should become a part of education at all levels.

d) Implications for Technical Education System

In order to respond to the changes and challenges envisaged, the technical education system will have to undergo major changes in its curricula and approach. Apart from providing appropriate education and training to students, it must emphasize on aspects like problem solving, learning-to-learn and continuing education. Different technologies require different orientations such as R & D, practical engineering, maintenance, etc.

Evidently, such a situation would call for a reorganization of the academic programmes, providing opportunities for broad based, and selectively multi-disciplinary education to the individuals. It might also be expected that demand for technical manpower in future would be exercised not in terms of narrow disciplinary names, but in terms of composite skill and knowledge areas. In such circumstances, one would only be allowed to visualize change broadly in terms of manpower groups and inter-se proportions.

In view of the above requirements, the technical education system will have to provide for:

i) Initial engineering education of different categories of personnel like R & D scientists and engineers, technologists, field engineers, technicians and craftsmen ;

ii) A strong system of continuing education for professionals working in industry whose requirement for further education will depend upon the needs of the individuals and employers;

iii) A variety of programmes at different levels and of different durations leading to a certification or skill upgradation without certification;

iv) A high level of flexibility in the technical education system to meet the requirements of different target groups with short turn around time.

v) Reorganization of the academic programmes, providing opportunities for broad based multi-disciplinary education incorporating composite skills and knowledge.

vi) Efficient management processes with better procedural configurations.

vii) Sustaining motivation of teachers with better appropriate work environment.

viii) Better sensitivity and responsiveness of the system to meet the changing needs.

There are 86 polytechnics exclusively for women in the country. Still, in terms of their population, women have less opportunities for technical education. In terms of percentage enrollment, women students account for only 12 per cent of the total enrollment in diploma programmes. Economically and socially weaker sections,

population in far flung areas and the physically handicapped have limited access to polytechnic education.

Since the establishment of TTTIs in 1967, design of curricula is done more scientifically with the involvement of a large number of teachers and professionals from industries. Still the output of the courses do not meet the needs of the industries because the competencies developed do not match the job functions of technicians at different level in the industries. The intake for the diploma courses is from the school system. Professionals working in industries are not able to seek admission to polytechnic courses as the courses are mostly full-time.

e) Polytechnic Teachers

The teachers in polytechnics are generally graduates from engineering colleges who are appointed as lecturers and diploma holders from polytechnics who are employed as demonstrators and instructors. As per the Madan Committee recommendations, the lowest cadre of teaching position in polytechnics is that of lecturer. There are still a large number of diploma holders in polytechnics who do not fit in with the new staff structure as per the Madan Committee recommendations.

About 30 to 40 per cent of teaching positions remain vacant in polytechnics in most of the disciplines. In certain emerging technological areas, vacancies may be as high as 60 per cent.

For the professional development of polytechnic teachers, TTTIs were established by the Government of India in the year 1967. TTTIs conduct long term teacher training programmes awarding a diploma in technical teaching and a large number of short term refresher courses. Some States have recognized the diploma in technical teaching as a qualification for promotion to the post of lecturer while others have not.

In most of the States, the pay-scales are comparatively poor. AICTE recommended pay scales have been implemented in a few States only. There is no specific programme (like QIP for engineering colleges teachers) for upgradation of qualifications of polytechnic teachers.

f) Funding

There are three types of institutions in the country namely: Government Institutions, Private and Governmental aided institutions and self-financing institutions. The polytechnics are generally funded by the State Governments both for initial capital expenditure and for recurring expenses. In the case of aided institutions, the Government provides grants to the extent of about 90 per cent of the recurring expenses. Self-financing institutions are not provided with any funds from the government.

Polytechnics were generally starved of funds and the system as a whole had very meagre allocations in all the five year plans. The amount provided was hardly

sufficient to maintain and run the institutions. Developmental needs and modernization could not be met. There were some central intervention schemes like Direct Central Assistance (DCA) which provided some funds to selected polytechnics for modernization; but the amount of funds provided was low and could not support many of the institutions. There were no institutions to generate resources by offering their services to the community and industries around. Any income generated was taken as a part of general revenue and the budgetary allocation was correspondingly reduced.

g) Management Structure

The Bureau of Technical Education, in the Ministry of Human Resource Development, is the main funding agency at the national level. The Bureau of Technical Education funded some polytechnics through central intervention schemes for their development like modernization, removal of obsolescence, community polytechnics, establishment of audio-visual centres, advanced diploma courses, industry-institute interaction, computerization, continuing education, etc.

At the State level, the State Directorates of Technical Education, are the funding and administering agencies of polytechnic education. In some States, there is a Board of Technical Education, which has functions of academic nature like: curriculum development, conduct of examinations, institutional evaluation, accreditation and certification. In most of the States, State Boards do not exist and where they are established, function as a part of the Directorate. State Boards of Technical Education function independently only in a few states.

Through an act of Parliament, the All India Council for Technical Education has been made a statutory body and is vested with powers to control the development of technical education. AICTE is just beginning to perform the statutory role vested in it by the Act of Parliament. The AICTE is to establish a National Board of Accreditation (NBA) which will have the exclusive function of accreditation of institutions and programmes. The NBA, functioning independently, will have statutory powers to inspect institutions and evaluate programmes for accreditation.

h) Linkages

The linkages between the different sectors of technical education like the engineering degree education, diploma education and certificate training is very limited. Polytechnics, in particular, have little interaction with the industry who employ their products. No mechanism or strategy exists for the industry to participate actively in the management, development of curricula, instructional processes and evaluation in polytechnic education.